CERT

Garbage Collection: Using Flow to Understand Private Network Data Leakage

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Report Documentation Page

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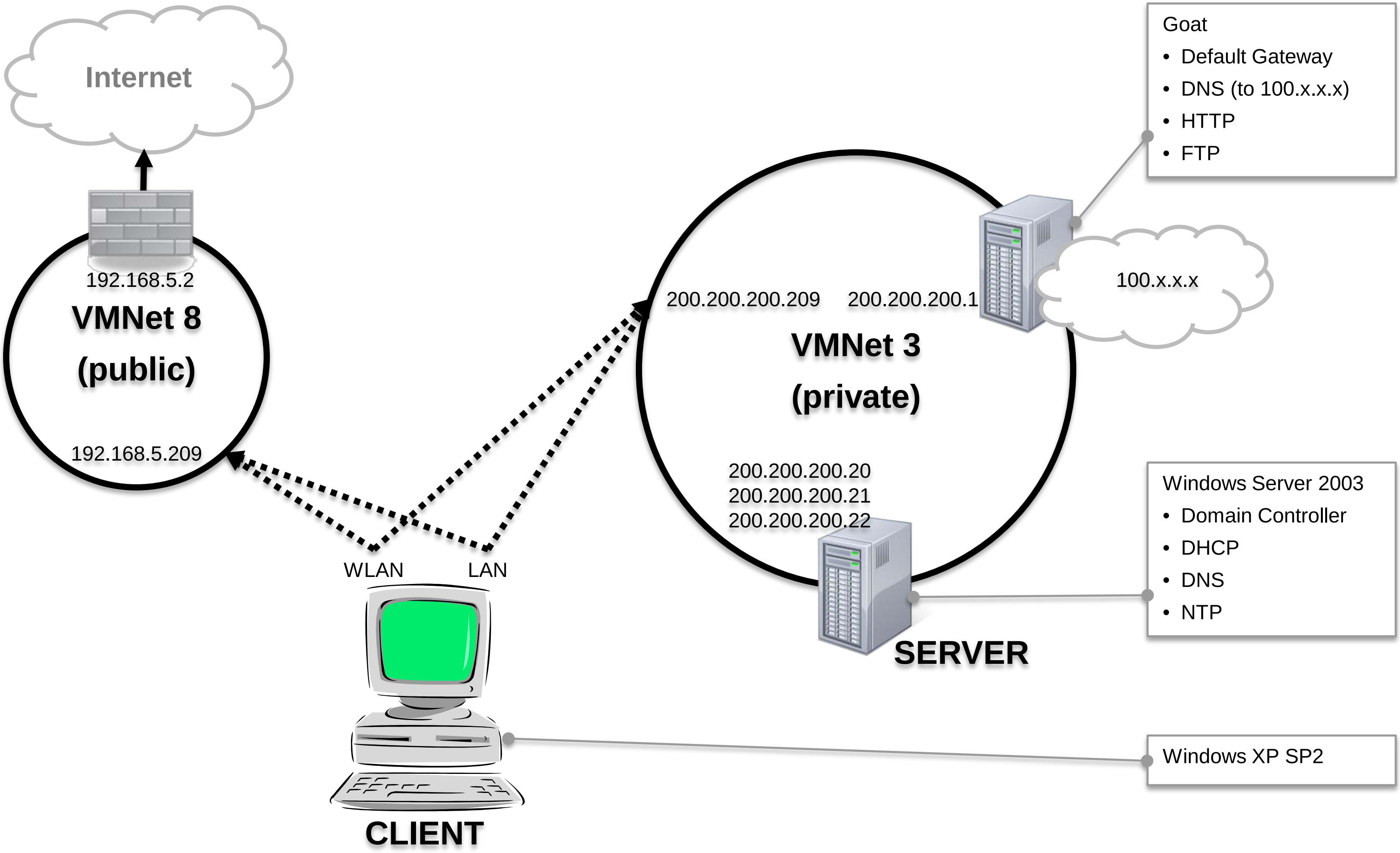
Virtual Layout



Goat

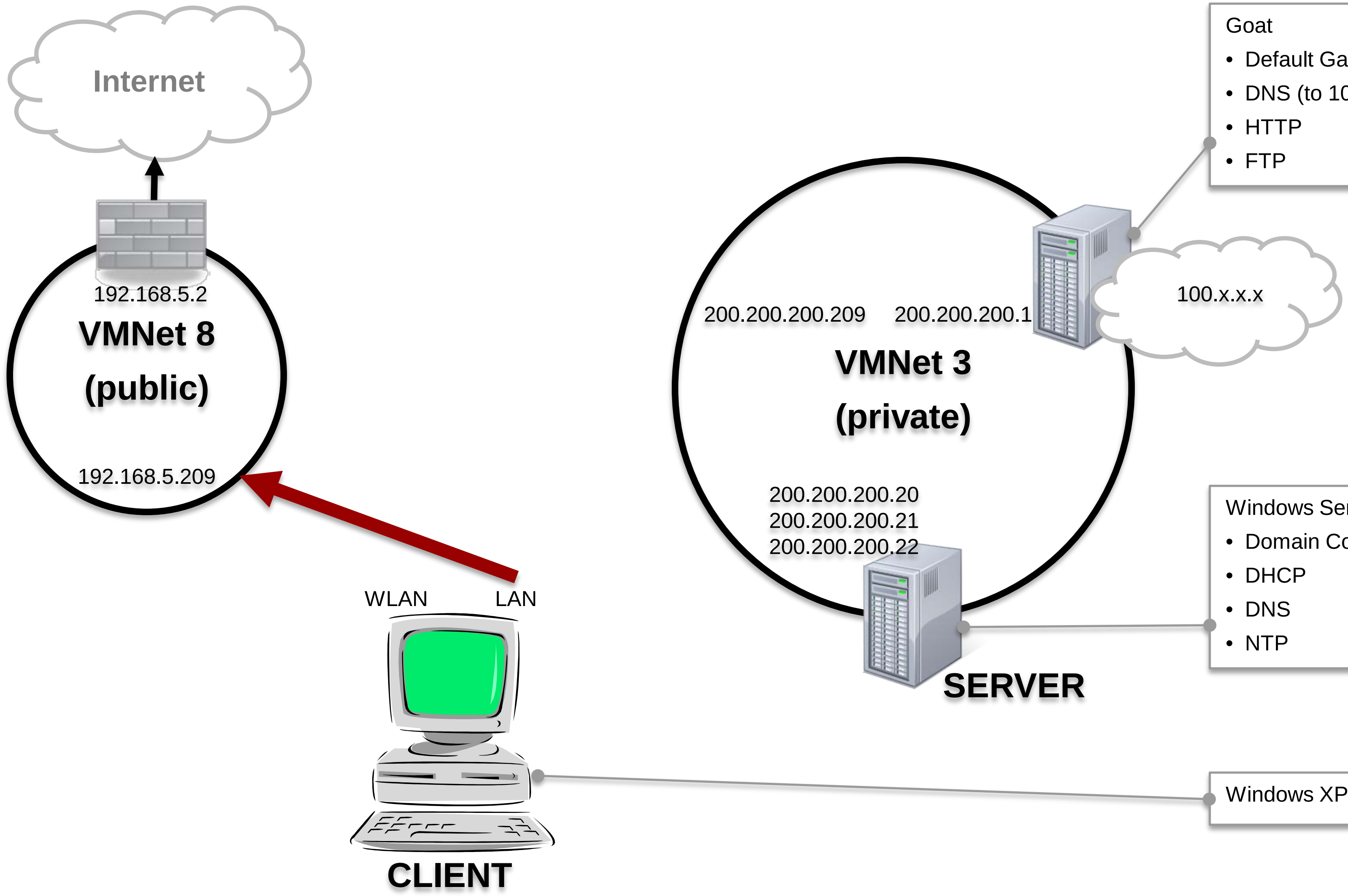
- Default Gateway
- DNS (to 100.x.x.x)
- HTTP
- FTP

Windows Server 2003

- Domain Controller
- DHCP
- DNS
- NTP

Windows XP SP2

Experiment 1: Stand-alone boot



Goat

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Windows Server 2003

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Windows XP SP2

Experiment 1: Procedure

1. Start ethereal on HOST
2. Start ethereal on GOAT
3. Connect LAN on CLIENT to vmnet8
4. Start CLIENT
5. Verify internet connectivity: browse to www.cnn.com and get a legitimate web page
6. Stop packet capture on HOST and save as vmnet3.pcap.
7. Stop packet capture on GOAT and save as vmnet8.pcap.

Results 1: Stand-alone boot

```
|---------|-------------------|-------------------|-------------------|-------------------|
|Time     | 0.0.0.0           | 255.255.255.255   | 192.168.5.249     | 192.168.5.207     |
|---------|-------------------|-------------------|-------------------|-------------------|
|0.000    |         DHCP Request                  |                   |                   |
|         |(68)     ------------------>  (67)     |                   |                   |
|0.000    |                   |                   |         DHCP ACK      - Tra           |
|         |                   |                   |(67)     ------------------>  (68)     |
|---------|-------------------|-------------------|-------------------|-------------------|

|---------|-------------------|-------------------|-------------------|-------------------|-------------------|
|Time     | 192.168.5.207     | 192.168.5.2       | 192.168.5.255     | 224.0.0.22        | 207.46.232.182    |
|---------|-------------------|-------------------|-------------------|-------------------|-------------------|
|2.746    |         NBNS      |                   |                   |                   |                   |NBNS: Multi-homed registration NB CLIENT<00>
|         |(137)    ------------------>  (137)    |                   |                   |                   |
|7.296    |         NBNS      |                   |                   |                   |                   |NBNS: Registration NB CLIENT<00>
|         |(137)    -------------------------------------->  (137)    |                   |                   |
|10.312   |         NBNS      |                   |                   |                   |                   |NBNS: Registration NB WORKGROUP<00>
|         |(137)    ------------------>  (137)    |                   |                   |                   |
|14.835   |         NBNS      |                   |                   |                   |                   |NBNS: Registration NB WORKGROUP<00>
|         |(137)    -------------------------------------->  (137)    |                   |                   |
|18.358   |         NBNS      |                   |                   |                   |                   |NBNS: Multi-homed registration NB CLIENT<20>
|         |(137)    ------------------>  (137)    |                   |                   |                   |
|25.888   |         NBNS      |                   |                   |                   |                   |BROWSER: Host Announcement CLIENT, Workstation, Serv
|         |(138)    -------------------------------------->  (138)    |                   |                   |
|26.726   |         DNS       |                   |                   |                   |                   |DNS: Standard query A time.windows.com
|         |(1025)   ------------------>  (53)     |                   |                   |                   |
|27.900   |         IGMP      |                   |                   |                   |                   |IGMP: V3 Membership Report / Join group 239.255.255.
|         |(0)      ---------------------------------------------------------->  (0)      |                   |
|---------|-------------------|-------------------|-------------------|-------------------|-------------------|
```

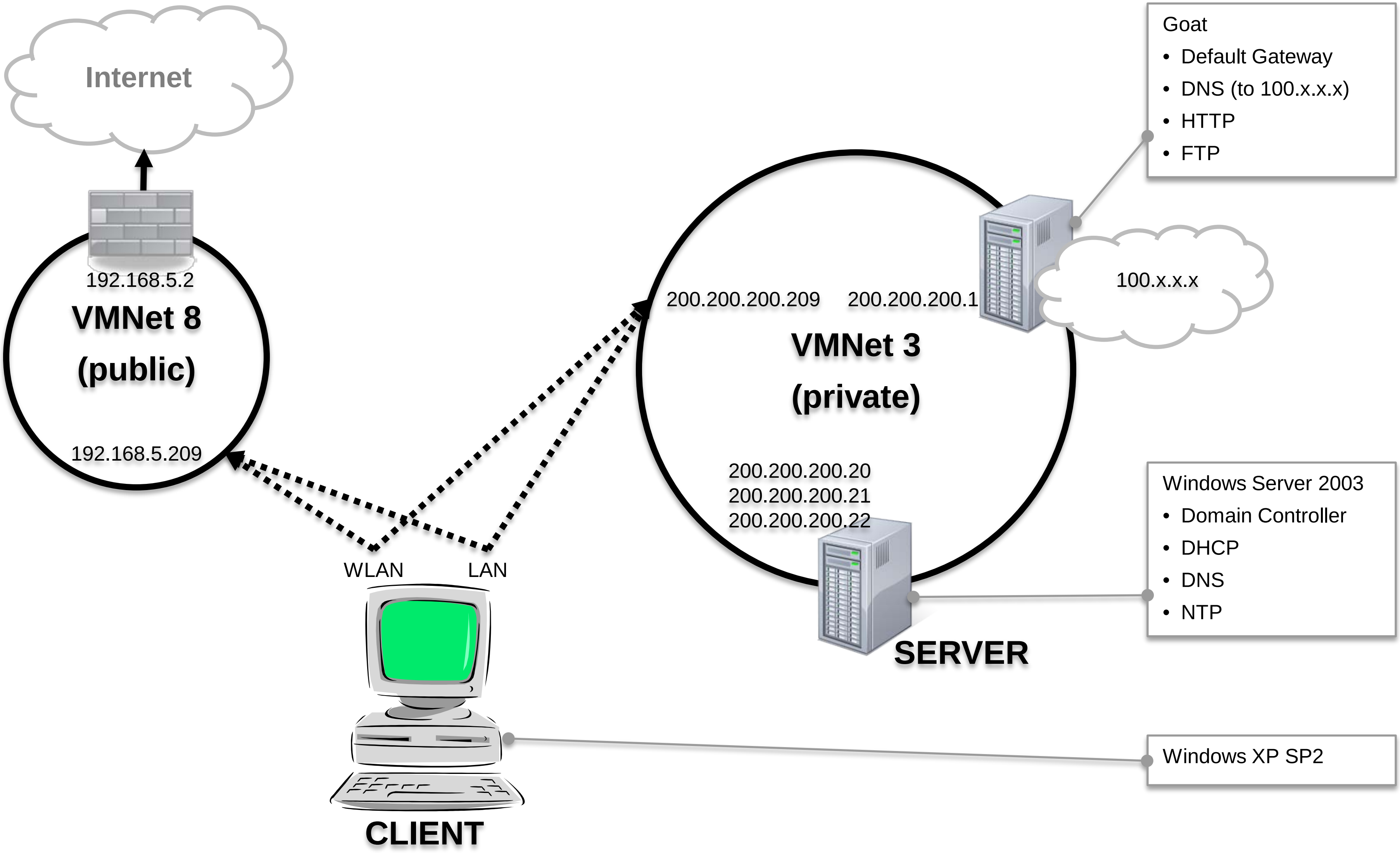
[continued]

Results 1: Stand-alone boot (2)

```
|---------|-------------------|-------------------|-------------------|
|Time     | 192.168.5.207     | 192.168.5.2       | 207.46.232.182    |
|---------|-------------------|-------------------|-------------------|
|28.807   |         DNS       |                   |                   |DNS: Standard query A time.windows.com
|         |(1025)   ------------------>  (53)     |                   |
|30.749   |         DNS       |                   |                   |DNS: Standard query response CNAME time.microsoft.akadns.net A 207.46.232.182
|         |(1025)   <------------------  (53)     |                   |
|30.822   |         NTP       |                   |                   |NTP: NTP symmetric active
|         |(123)    -------------------------------------->  (123)    |
|---------|-------------------|-------------------|-------------------|


|---------|-------------------|-------------------|-------------------|
|Time     | 192.168.5.207     | 192.168.5.2       | 157.166.226.25    |
|---------|-------------------|-------------------|-------------------|
|72.489   |         Standard query A ww           |                   |DNS: Standard query A www.cnn.com
|         |(1025)   ------------------>  (53)     |                   |
|73.490   |         Standard query A ww           |                   |DNS: Standard query A www.cnn.com
|         |(1025)   ------------------>  (53)     |                   |
|74.491   |         Standard query A ww           |                   |DNS: Standard query A www.cnn.com
|         |(1025)   ------------------>  (53)     |                   |
|76.492   |         Standard query A ww           |                   |DNS: Standard query A www.cnn.com
|         |(1025)   ------------------>  (53)     |                   |
|76.604   |         Standard query resp           |                   |DNS: Standard query response A 157.166.226.25 A 157.166.226.26 A 157.166.255.18 A 157.166.25
|         |(1025)   <------------------  (53)     |                   |
|76.625   |         iad3 > http [SYN] S           |                   |TCP: iad3 > http [SYN] Seq=0 Win=64240 Len=0 MSS=1460
|         |(1032)   -------------------------------------->  (80)     |
|76.670   |         http > iad3 [SYN, A           |                   |TCP: http > iad3 [SYN, ACK] Seq=0 Ack=1 Win=64240 Len=0 MSS=1460
|         |(1032)   <--------------------------------------  (80)     |
|76.682   |         iad3 > http [ACK] S           |                   |TCP: iad3 > http [ACK] Seq=1 Ack=1 Win=64240 Len=0
|         |(1032)   -------------------------------------->  (80)     |
|76.722   |         GET / HTTP/1.1                |                   |HTTP: GET / HTTP/1.1
|         |(1032)   -------------------------------------->  (80)     |
|76.722   |         http > iad3 [ACK] S           |                   |TCP: http > iad3 [ACK] Seq=1 Ack=455 Win=64240 Len=0
|         |(1032)   <--------------------------------------  (80)     |
|---------|-------------------|-------------------|-------------------|
```

Scenario 2: Standalone boot on private



Internet

192.168.5.2

VMNet 8

(public)

192.168.5.209

200.200.200.209

200.200.200.1

VMNet 3

(private)

200.200.200.20
200.200.200.21
200.200.200.22

100.x.x.x

WLAN

LAN

CLIENT

SERVER

Goat

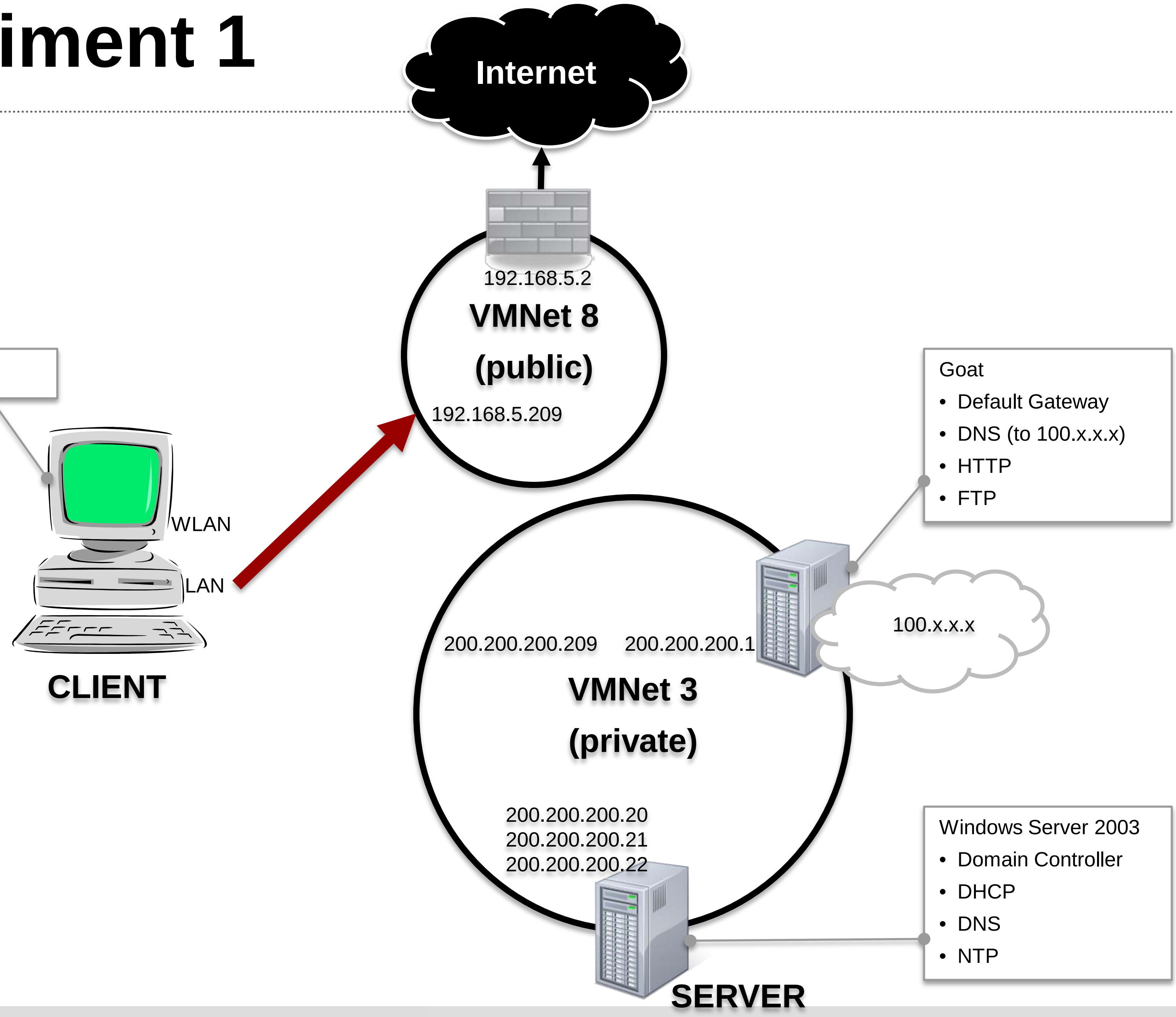
- Default Gateway
- DNS (to 100.x.x.x)
- HTTP
- FTP

Windows Server 2003

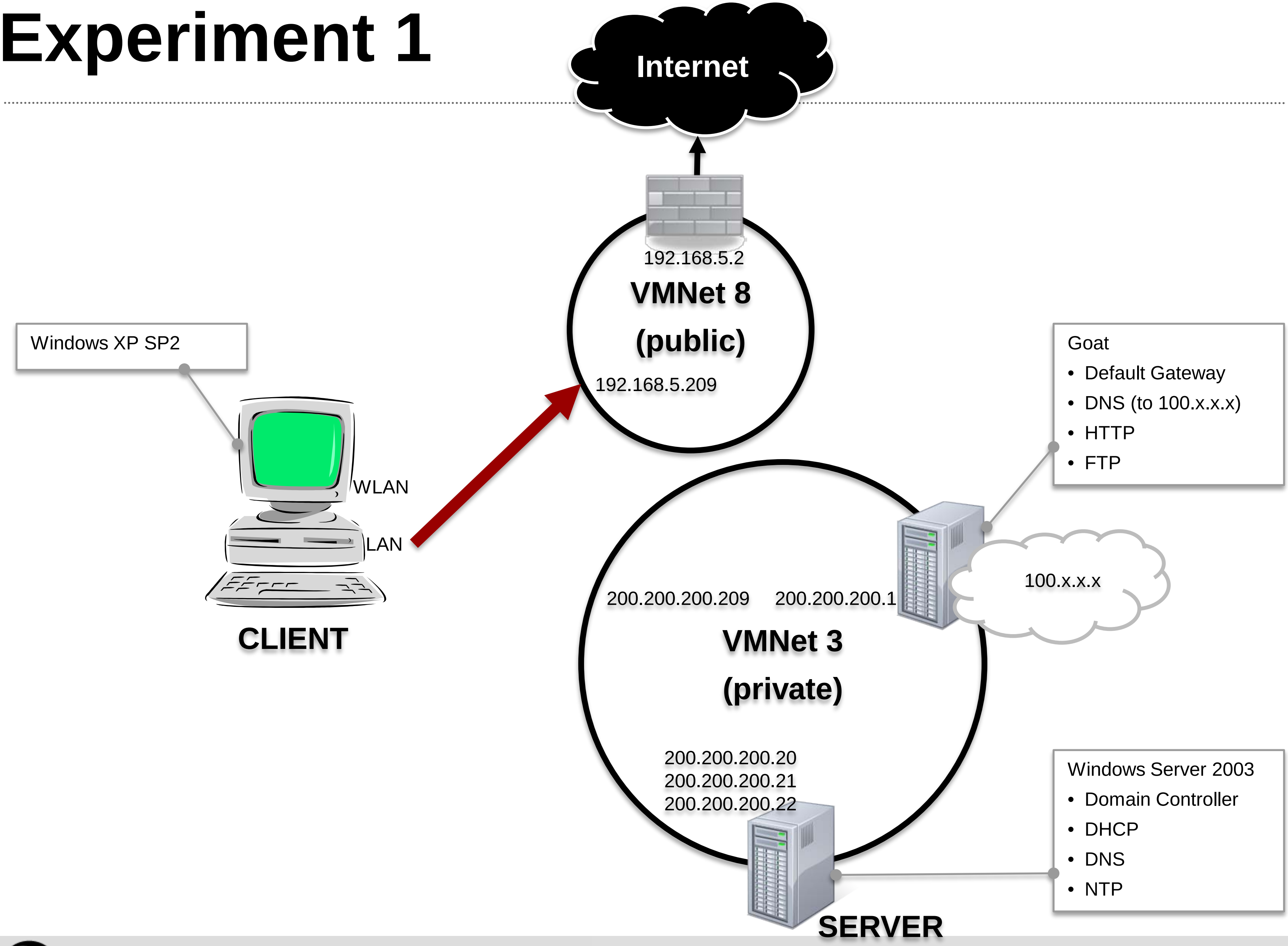
- Domain Controller
- DHCP
- DNS
- NTP

Windows XP SP2

Experiment 1



Experiment 1



Windows XP SP2

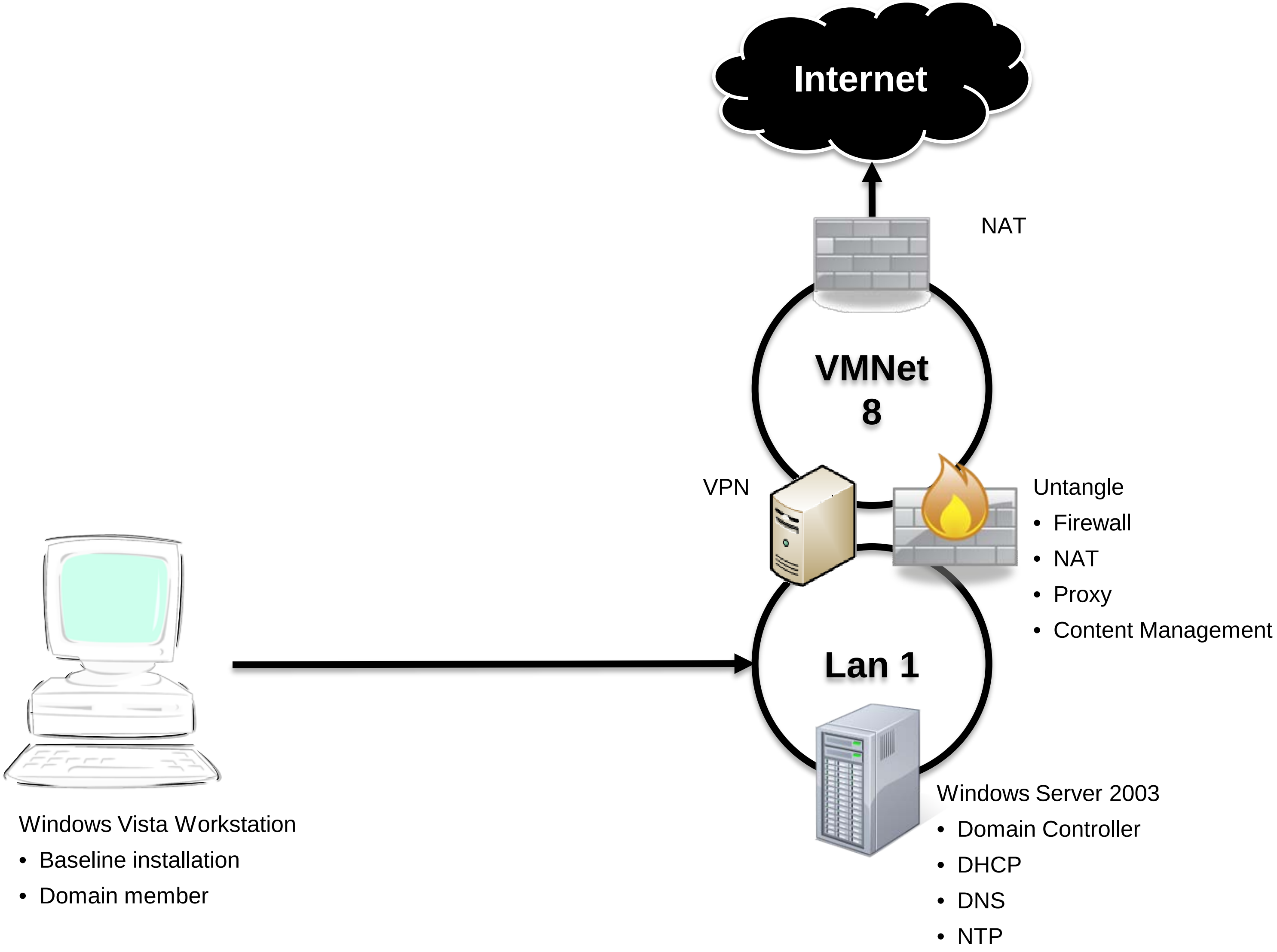
Goat

- Default Gateway
- DNS (to 100.x.x.x)
- HTTP
- FTP

Windows Server 2003

- Domain Controller
- DHCP
- DNS
- NTP

Scenario 1: Restart on Another Network



Untangle

- Firewall
- NAT
- Proxy
- Content Management

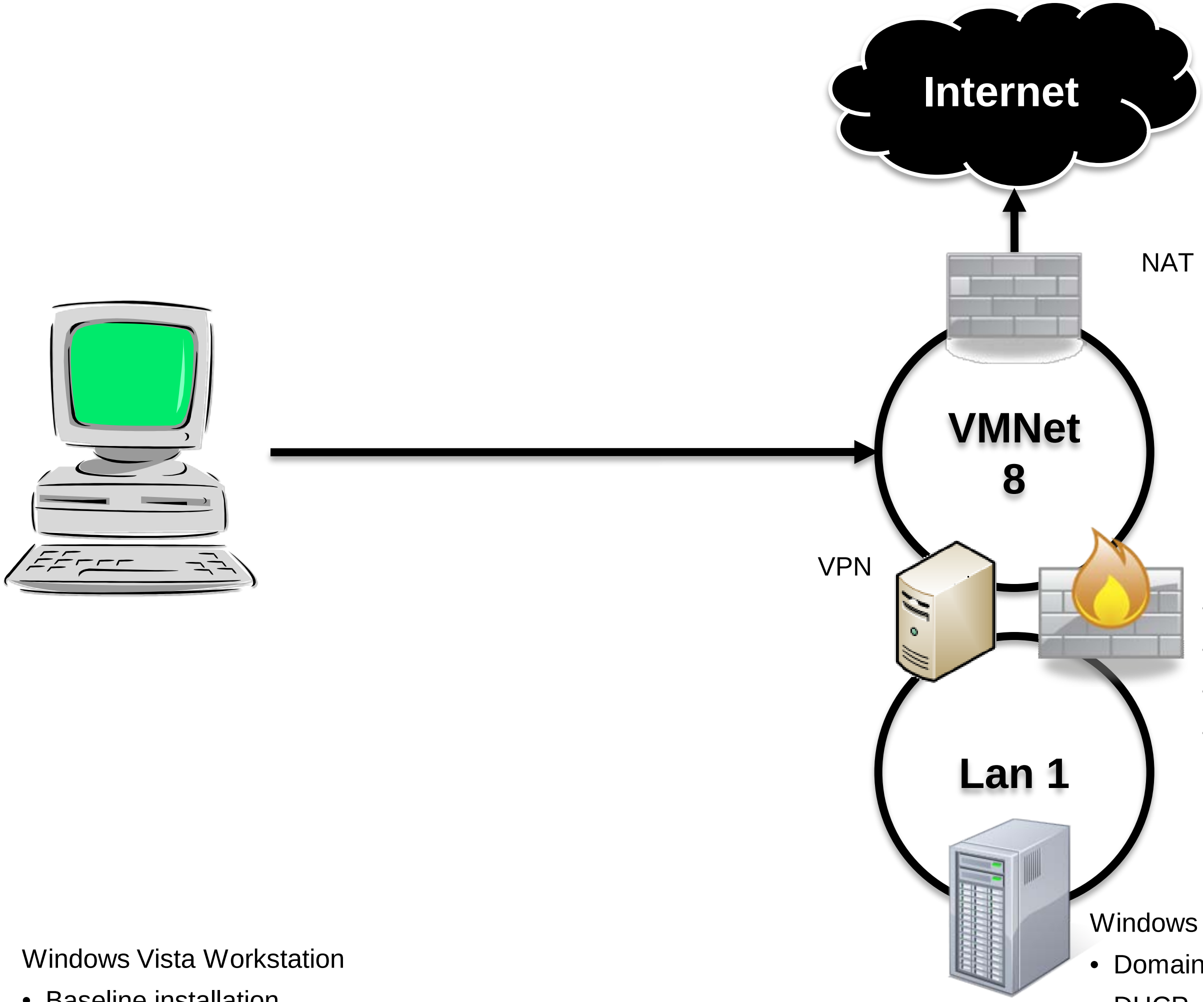
Windows Server 2003

- Domain Controller
- DHCP
- DNS
- NTP

Windows Vista Workstation

- Baseline installation
- Domain member

Scenario 1: Restart on Another Network



Untangle

- Firewall
- NAT
- Proxy
- Content Management

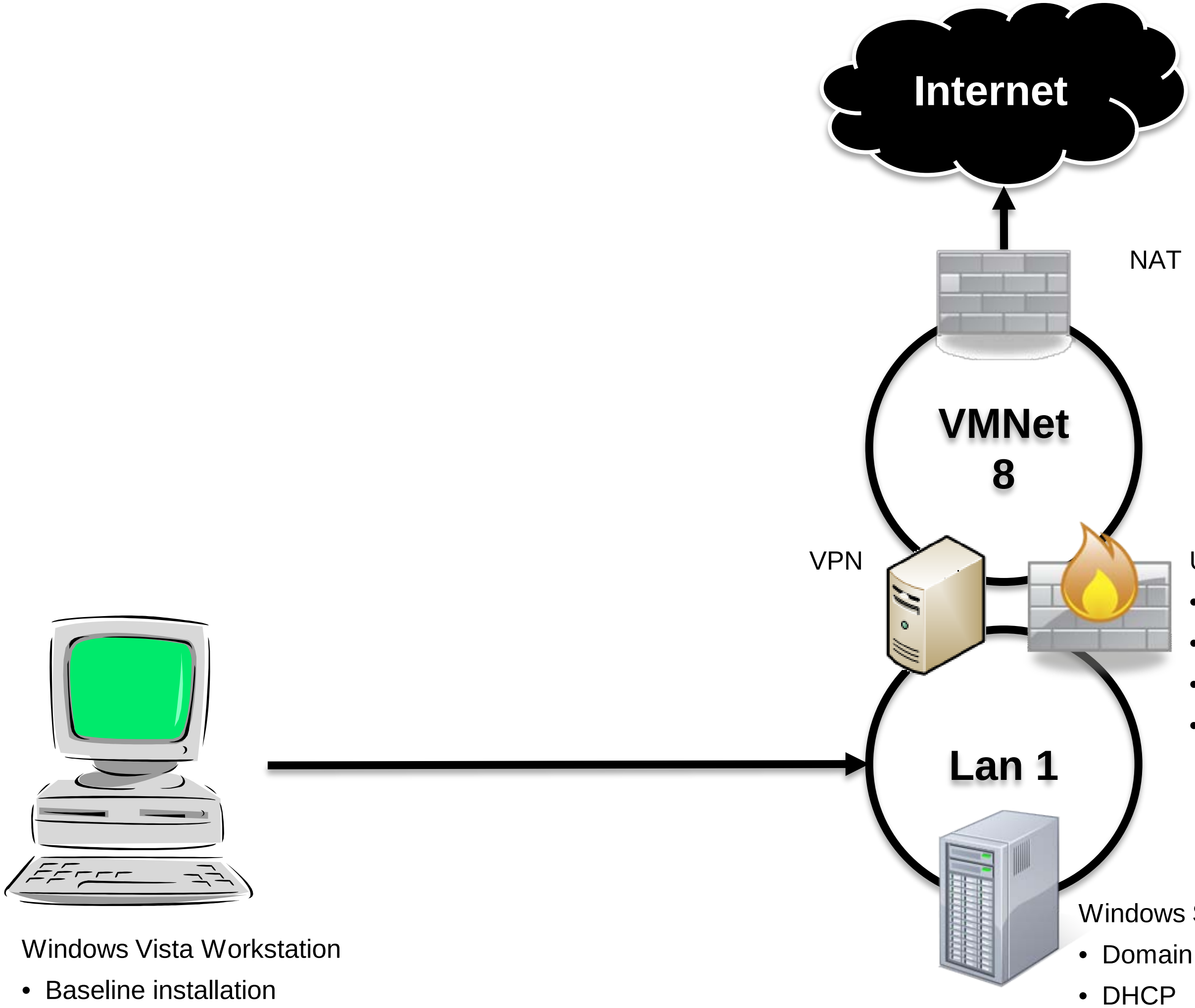
Windows Server 2003

- Domain Controller
- DHCP
- DNS
- NTP

Windows Vista Workstation

- Baseline installation
- Domain member

Scenario 2: Move to Another Network



Untangle

- Firewall
- NAT
- Proxy
- Content Management

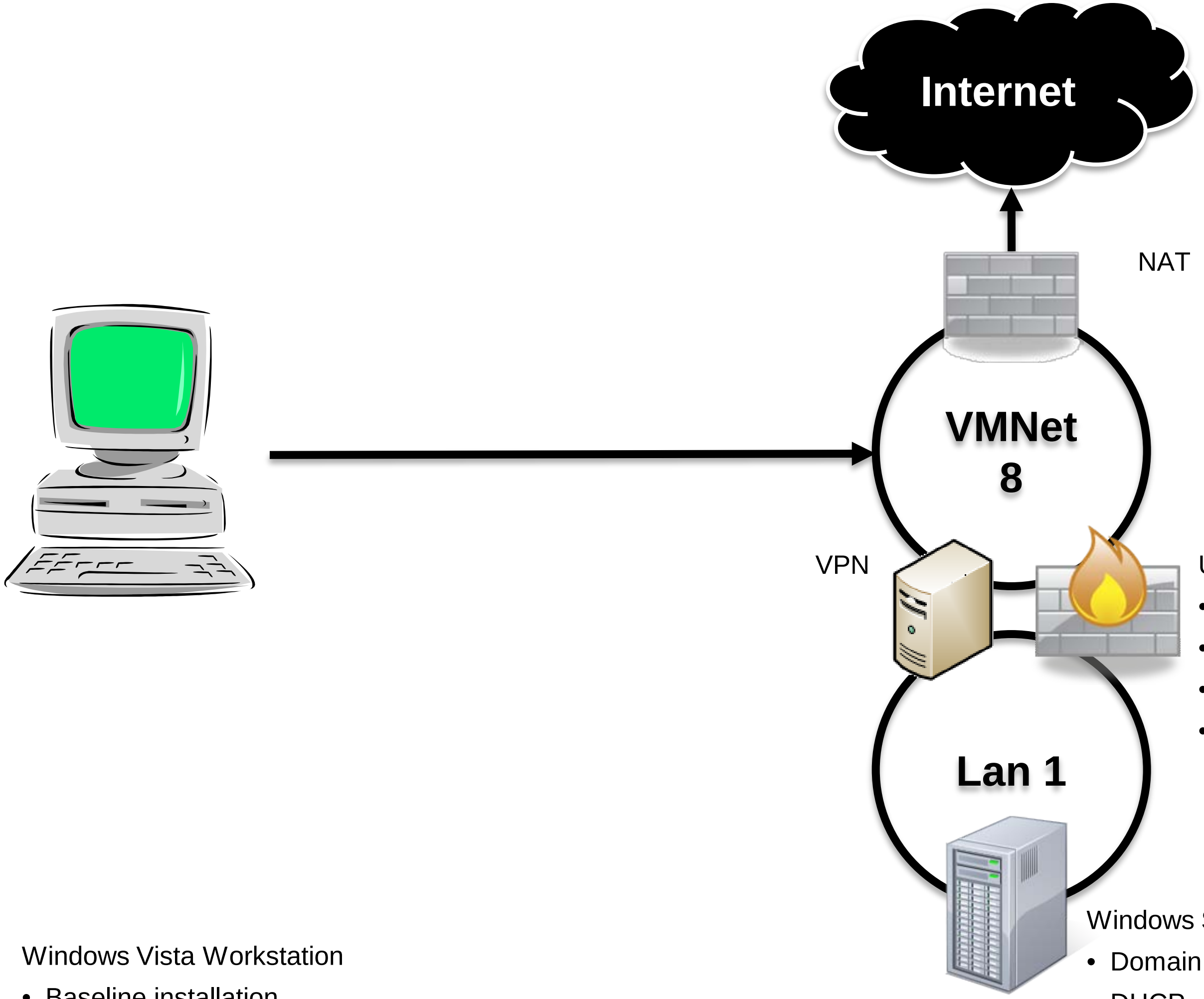
Windows Vista Workstation

- Baseline installation
- Domain member

Windows Server 2003

- Domain Controller
- DHCP
- DNS
- NTP

Scenario 2: Move to Another Network



Untangle

- Firewall
- NAT
- Proxy
- Content Management

Windows Server 2003

- Domain Controller
- DHCP
- DNS
- NTP

Windows Vista Workstation

- Baseline installation
- Domain member